THE INVENTION CLAIMED IS:

1. In a planar fuel cell stack, the improvement comprising:

means for providing co-flow of fuel and oxidant gases, and

means for surface sealing a cell so as to provide an increased effective seal area and improved durability of the seal.

2. The improvement of Claim 1, wherein said means for providing co-flow includes an integral, internal manifold for each of the fuel and oxidant gases.

3. The improvement of Claim 1, wherein said means for surface sealing the cell includes a plate having an aperture and a rim area adjacent said aperture, said cell being positioned in said plate such that a peripheral surface thereof is located on said rim area forming a surface seal therebetween.

4. The improvement of Claim 1, wherein said cell comprises a solid oxide fuel cell.

5. A co-flow planar fuel cell, including:

a first interconnect plate,

a cell casing/holder plate having an aperture,

a fuel cell, and

a second interconnect plate,

said first and second interconnect plates and said cell casing/holder plates each having at least one pair of openings therein and aligned with an adjacent plate for co-flow of a gaseous fuel and an oxidant therethrough, said fuel cell being peripherally mounted in said cell casing/holder plate on a surface of a rim section located adjacent said aperture.

6. The fuel cell of Claim 5, wherein at least one of said interconnect plates is provided at least one side with members forming flow channels therebetween.

7. The fuel cell of Claim 5, wherein each of said first and second interconnect plates and said cell casing/holder plate is provided with at least one pair of openings located in end sections thereof and wherein said openings in adjacent plates are aligned to provide co-flow of said gaseous fuel and said oxidant therethrough.

8. The fuel cell of Claim 5, wherein said cell casing/holder plate additionally includes a pair of openings in opposite end sections thereof, and a cut-away section defining said rim section and including an opposite opening of each of said pair of openings.

9. The fuel cell of Claim 5, additionally including at least one additional interconnect plate, and at least one additional cell casing/holder plate retaining another fuel cell therein, said cell casing/holders plates being sandwiched between two interconnect plates to form a stack of fuel cells, each of said at least one additional interconnect plate and said at least one additional cell casing/holder plates having pairs of openings therein and which are adapted to aligning with openings in an adjacent plate to provide co-flow of the gaseous fuel and oxidant through the entire stack of fuel cells.

10. The fuel cell of Claim 9, wherein each outer interconnect plate forming said stack of fuel cells includes only a single pair of openings in one end section thereof, the pair of openings in one of said outer interconnect plates being operatively connected to supply of gaseous fuel and oxidant to the stack of fuel cells, and the pair of openings in another of said outer interconnect plates providing discharge for said gaseous fuel and oxidant from said stack of fuel cell.

11. The fuel cell of Claim 10, wherein said fuel cells each comprises a solid oxide fuel cell.

12. The fuel cell of Claim 11, wherein each of said cell casing/holder plates additionally includes a cut-away section defining said rim section and extending around one of said openings of each of said pairs of openings, whereby gaseous fuel passes across a top surface of said fuel cells.

13. The fuel cell of Claim 12, additionally including a plurality of radially extending slots of any shapes and dimensions extending from each of said one of said opening of each of said pairs of openings to provide gas flow distribution.

14. The fuel cell of Claim 13, wherein certain of said interconnect plates are provided with members form flow channels therebetween, through which the gaseous oxidant or fuel passes.

15. A co-flow planar solid oxide fuel cell stacks, comprising:

a bottom plate having a pair of spaced openings in one end section,

a plurality of cell casing/holder plates having a pair of spaced openings in each end section thereof,

a plurality of fuel cells positioned in a surface seal arrangement in said cell casing/holder plates,

at least one intermediate plate having a pair of spaced openings in each end section thereof, and

a top plate having a pair of spaced openings in one end section,

wherein when stacked a pair of said spaced openings in each of said plurality of cell casing/holder plates and a pair of said spaced openings in said at least one intermediate electrode plate align with said pair of spaced openings in said bottom plate, and

wherein another pair of said spaced openings in each of said plurality of cell casing/holder plates and another pair of said spaced openings in said at least one intermediate electrode plate align with said pair of spaced openings in said top plate,

thereby forming a co-flow internal manifold for gasous fuel and oxidant passing through said fuel cell stock.

16. The fuel cell stack of Claim 15, wherein at least said bottom plate and said at least one intermediate plate each include a plurality of spaced members forming flow channels therebetween.

17. The fuel cell stack of Claim 16, wherein each of said cell casing/holder plates include an aperture and a cutaway section forming a rim surface adjacent said aperture, said fuel cell being retained by said rim surface and sealed at the periphery thereof to said rim surface.

18. The fuel cell stack of Claim 17, wherein said cutaway section extends around one opening of each pair of spaced openings in said cell/holder plates.

19. The fuel cell stack of Claim 18, wherein said cutaway section includes a plurality of radial slots extending from said one opening of each pair of spaced openings.